

CLAIMS

What is claimed:

- 1 1. A microelectronic package, comprising:
2 a die; and
3 a heat spreader coupled to the backside of the die, the heat
4 spreader including a plurality of pillars surrounding the die to shift thermally
5 induced stress away from the corners and edges of the die to the pillars of the
6 heat spreader.
- 1 2. The microelectronic package of Claim 1 wherein the heat spreader
2 is fabricated from a material having a coefficient of thermal expansion
3 substantially equivalent to a coefficient of thermal expansion of the die.
- 1 3. The microelectronic package of Claim 1 wherein the heat spreader
2 is coupled to the die using heat conductive adhesive.
- 1 4. The microelectronic package of Claim 1 wherein the plurality of
2 pillars surrounding the die protect the corners and edges of the die from cracking
3 due to thermally induced stress.
- 1 5. A microelectronic package, comprising:
2 a die affixed to a carrier substrate; and
3 a heat spreader coupled to the backside of the die, the heat
4 spreader including a plurality of pillars surrounding the die to shift thermally

5 induced stress away from the corners and edges of the die to the pillars of the
6 heat spreader.

1 6. The microelectronic package of Claim 5 wherein an active surface
2 of the die is affixed to an active surface of the carrier substrate, a plurality of
3 solder balls disposed on an active surface of the die aligned with a plurality of
4 bond pads disposed on an active surface of the substrate.

1 7. The microelectronic package of Claim 5 wherein the substrate is
2 fabricated from organic or ceramic material.

1 8. The microelectronic package of Claim 5 wherein the heat spreader
2 is fabricated from a material having a coefficient of thermal expansion
3 substantially equivalent to a coefficient of thermal expansion of the die.

1 9. The microelectronic package of Claim 5 wherein the heat spreader
2 is coupled to the die using heat conductive adhesive.

1 10. The microelectronic package of Claim 1 wherein the plurality of
2 pillars surrounding the die protect the corners and edges of the die from cracking
3 due to thermally induced stress.

1 11. The microelectronic package of Claim 5 wherein a through-hole
2 extends from a first exterior surface to a second exterior surface of the substrate,

3 the through-hole configured to allow the flow of an underfill encapsulation
4 material into a gap between the die, the substrate, and the heat spreader.

1 12. The microelectronic package of Claim 11 wherein a vent hole
2 extends from a first exterior surface to a second exterior surface of the substrate,
3 the vent hole configured to allow air to escape from between the die, the
4 substrate, and the heat spreader as the underfill encapsulation material is
5 dispensed via the through-hole.

1 13. The microelectronic package of Claim 5 wherein a through-hole
2 extends from a first exterior surface to a second exterior surface of the heat
3 spreader, the through-hole configured to allow the flow of an underfill
4 encapsulation material into a gap between the die, the substrate, and the heat
5 spreader.

1 14. The microelectronic package of Claim 11 wherein a vent hole
2 extends from a first exterior surface to a second exterior surface of the heat
3 spreader, the vent hole configured to allow air to escape from between the die,
4 the substrate, and the heat spreader as the underfill encapsulation material is
5 dispensed via the through-hole.

1 15. The microelectronic package of Claim 5 wherein mechanical
2 reinforcements connect the substrate and the heat spreader.

1 16. A process of fabricating a microelectronic package, comprising:
2 providing a die; and
3 coupling a heat spreader to one side of the die, the heat spreader
4 including a plurality of pillars surrounding the die to shift thermally induced
5 stress away from the corners and edges of the die to the pillars of the heat
6 spreader.

1 17. The process of Claim 16 wherein coupling of the heat spreader to
2 one side of the die comprises providing a heat spreader fabricated from a
3 material having a coefficient of thermal expansion substantially equivalent to a
4 coefficient of thermal expansion of the die.

1 18. The process of Claim 16 wherein the coupling of the heat spreader
2 to one side of the die comprises affixing heat conductive adhesive between the
3 backside of the die and the heat spreader.

1 19. A process of fabricating a microelectronic package, comprising:
2 providing a die affixed to a carrier substrate; and
3 coupling a heat spreader to the backside of the die using heat
4 conductive adhesive, the heat spreader including a plurality of pillars

5 surrounding the die to shift thermally induced stress away from the corners and
6 edges of the die to the pillars of the heat spreader.

1 20. The process of Claim 19 wherein providing the die affixed to the
2 carrier substrate comprises a die affixed to the substrate with a plurality of solder
3 balls disposed on an active surface of the die aligned with a plurality of bond
4 pads disposed on an active surface of the substrate.

1 21. The process of Claim 19 wherein providing the die affixed to the
2 carrier substrate comprises providing a carrier substrate made of organic or
3 ceramic material.

1 22. The process of Claim 19 wherein the coupling of the heat spreader
2 to the backside of the die comprises providing a heat spreader fabricated from a
3 material having a coefficient of thermal expansion substantially equivalent to a
4 coefficient of thermal expansion of the die.

1 23. The process of Claim 19 further comprising the dispensing of an
2 underfill encapsulation material via a through-hole extending from a first
3 exterior surface to a second exterior surface of the substrate, the underfill
4 encapsulation material flowing into a gap between the die, the heat spreader,
5 and the substrate.

1 24. The process of Claim 23 wherein the dispensing of the underfill
2 encapsulation material via the through-hole includes the release of air from
3 between the die, the substrate, and the heat spreader through a vent hole in
4 either the substrate or the heat spreader.

1 25. The process of Claim 19 further comprising the dispensing of an
2 underfill encapsulation material via a through-hole extending from a first
3 exterior surface to a second exterior surface of the heat spreader, the underfill
4 encapsulation material flowing into a gap between the die, the heat spreader,
5 and the substrate.

1 26. The process of Claim 25 wherein the dispensing of the underfill
2 encapsulation material via the through-hole includes the release of air from
3 between the die, the substrate, and the heat spreader through a vent hole in
4 either the substrate or the heat spreader.

1 27. The process of Claim 19 further comprising the attaching of
2 mechanical reinforcements between the substrate and the heat spreader.

1 28. A process of fabricating a microelectronic package, comprising:
2 providing a die affixed to a carrier substrate;
3 coupling a heat spreader to the backside of a die using heat
4 conductive adhesive, the heat spreader including a plurality of pillars

5 surrounding the die to shift thermally induced stress away from the corners and
6 edges of the die to the pillars of the heat spreader; and
7 injecting an underfill encapsulation material into a gap between the
8 die, the substrate, and the heat spreader.

1 29. The process of Claim 28 wherein providing the die affixed to the
2 carrier substrate comprises the die affixed to the substrate with a plurality of
3 solder balls disposed on an active surface of the die aligned with a plurality of
4 bond pads disposed on an active surface of the substrate.

1 30. The process of Claim 28 wherein coupling the heat spreader to the
2 backside of the die comprises providing a heat spreader fabricated from a
3 material having a coefficient of thermal expansion substantially equivalent to a
4 coefficient of thermal expansion of the die.

1 31. The process of Claim 28 wherein injecting the underfill
2 encapsulation material into the gap between the die, the heat spreader, and the
3 substrate comprises injecting the material into a through-hole extending from a
4 first exterior surface to a second exterior surface of the substrate.

1 32. The process of Claim 31 wherein dispensing the underfill
2 encapsulation material via the through-hole further comprises the release of air
3 from between the die, the substrate, and the heat spreader through a vent hole in
4 either the substrate or the heat spreader.

1 33. The process of Claim 28 wherein dispensing the underfill
2 encapsulation material into the gap between the die, the heat spreader, and the
3 substrate comprises injecting the material into a through-hole extending from a
4 first exterior surface to a second exterior surface of the heat spreader.

1 34. The process of Claim 33 wherein dispensing the underfill
2 encapsulation material via the through-hole further comprises the release of air
3 from between the die, the substrate, and the heat spreader through a vent hole in
4 either the substrate or the heat spreader.

1 35. The process of Claim 28 further comprising attaching mechanical
2 reinforcements between the substrate and the heat spreader.